DATA SHEET

NEC

PHOTOCOUPLER

PS2707-1,PS2707-2,PS2707-4

AC INPUT RESPONSE
HIGH COLLECTOR TO EMITTER VOLTAGE TYPE
SOP MULTI PHOTOCOUPLER SERIES

–NEPOC™ Series–

DESCRIPTION

The PS2707-1, PS2707-2, PS2707-4 are optically coupled isolators containing GaAs light emitting diodes and an NPN silicon phototransistor.

Each is mounted in a plastic SOP (Small Outline Package) for high density applications.

This package has shield effect to cut off ambient light.

FEATURES

- AC input response
- High collector to emitter voltage (V_{CEO} = 120 V)
- High isolation voltage (BV = 3 750 Vr.m.s.)
- Small and thin (SOP) package
- High-speed switching (t_r, t_f = 10 μs TYP.)
- Ordering number of taping product (1-ch only): PS2707-1-E3, E4, F3, F4
- UL approved: File No. E72422 (S)
- VDE0884 approved (Option)

★ APPLICATIONS

- Hybrid IC
- Telephone/FAX
- FA/OA equipment
- Programmable logic controllers

ORDERING INFORMATION

Part Number	Package	Safety Standard Approval
PS2707-1	4-pin SOP	Standard specification products • UL approved
PS2707-2	8-pin SOP	
PS2707-4	16-pin SOP	
PS2707-1-V	4-pin SOP	VDE0884 specification products (Option)
PS2707-2-V	8-pin SOP	
PS2707-4-V	16-pin SOP	

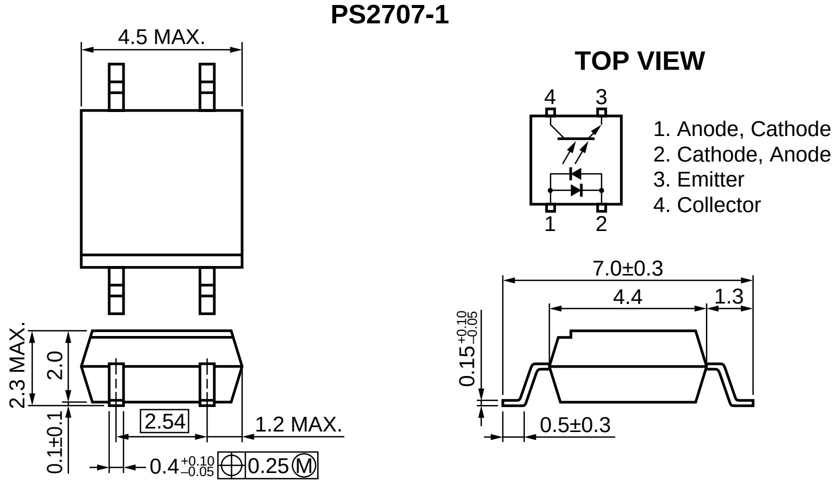
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Not all devices/types available in every country. Please check with local NEC representative for availability and additional information.

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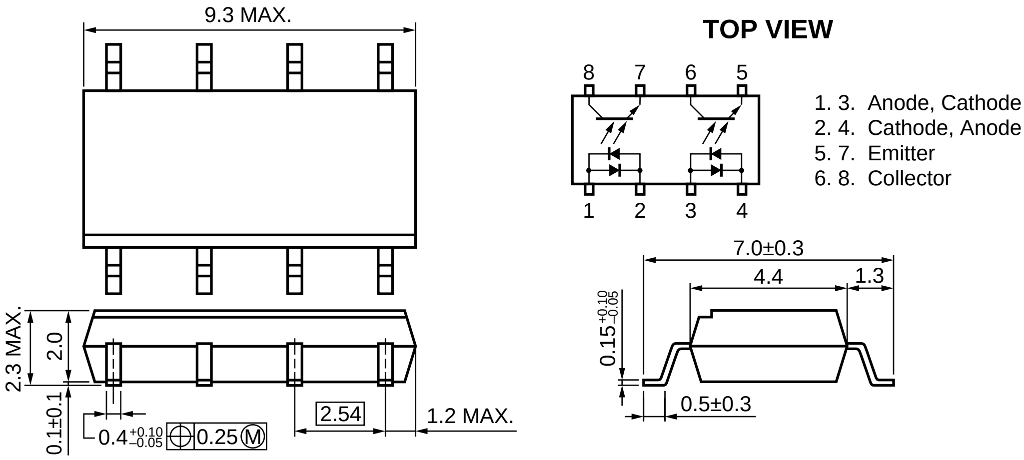
The mark ★ shows major revised points.

PACKAGE DIMENSIONS (in millimeters)

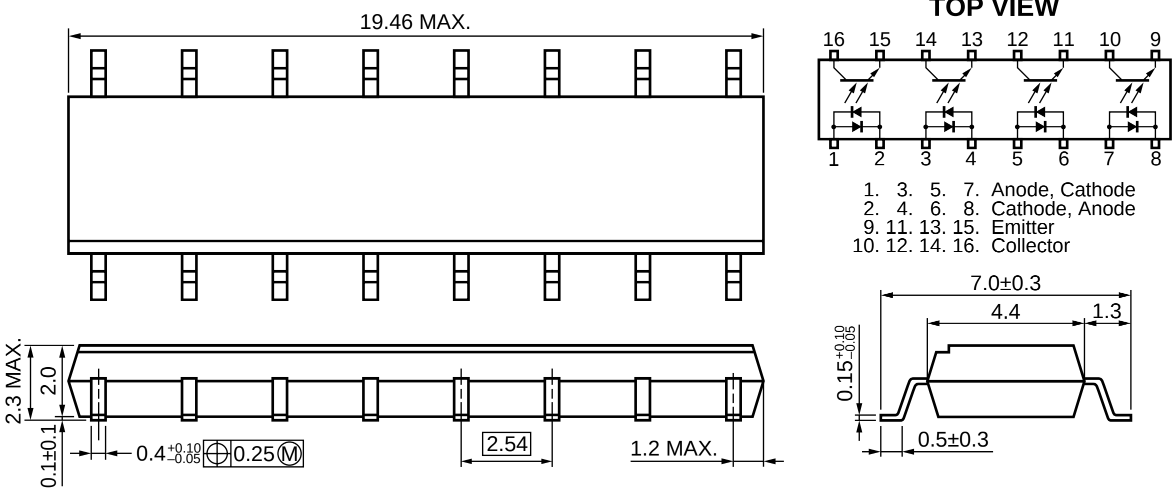
PS2707-1



PS2707-2



PS2707-4



ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C, unless otherwise specified)

Parameter		Symbol	Ratings		Unit
			PS2707-1	PS2707-2, PS2707-4	
Diode	Forward Current (DC)	I_F	± 50		mA
	Power Dissipation Derating	$\Delta P_D/°C$	0.8		mW/°C
	Power Dissipation	P_D	80		mW/ch
	Peak Forward Current*1	I_{FP}	± 1		A
Transistor	Collector to Emitter Voltage	V_{CEO}	120		V
	Emitter to Collector Voltage	V_{ECO}	6		V
	Collector Current	I_C	30		mA/ch
	Power Dissipation Derating	$\Delta P_C/°C$	1.5	1.2	mW/°C
	Power Dissipation	P_C	150	120	mW/ch
Isolation Voltage*2		BV	3 750		Vr.m.s.
Operating Ambient Temperature		T_A	–55 to +100		°C
Storage Temperature		T_{stg}	–55 to +150		°C

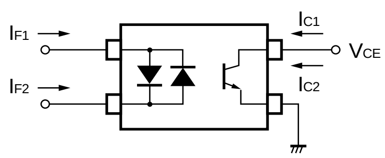
***1** PW = 100 μs, Duty Cycle = 1 %

***2** AC voltage for 1 minute at T_A = 25 °C, RH = 60 % between input and output

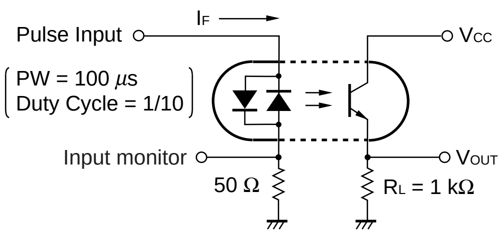
ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Diode	Forward Voltage	V_F	I_F = ± 5 mA		1.1	1.4	V
	Terminal Capacitance	C_t	V = 0 V, f = 1 MHz		60		pF
Transistor	Collector to Emitter Current	I_{CEO}	I_F = 0 mA, V_{CE} = 120 V			100	nA
Coupled	Current Transfer Ratio (I_C/I_F)	CTR	I_F = ± 5 mA, V_{CE} = 5 V	50	150	400	%
			I_F = ± 1 mA, V_{CE} = 5 V	10	80		
	CTR Ratio*1	CTR1/ CTR2	I_F = ± 5 mA, V_{CE} = 5 V	0.3	1.0	3.0	
	Collector Saturation Voltage	$V_{CE\,(sat)}$	I_F = ± 10 mA, I_C = 2 mA			0.3	V
	Isolation Resistance	R_{I-O}	V_{I-O} = 1 kV_{DC}	10^{11}			Ω
	Isolation Capacitance	C_{I-O}	V = 0 V, f = 1 MHz		0.4		pF
	Rise Time*2	t_r	V_{CC} = 5 V, I_C = 2 mA, R_L = 1 kΩ		10		μs
	Fall Time*2	t_f			10		

***1** CTR1 = I_{C1}/I_{F1}, CTR2 = I_{C2}/I_{F2}

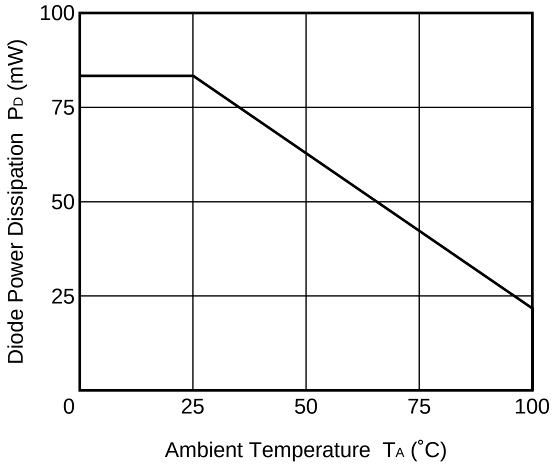


★ ***2** Test circuit for switching time

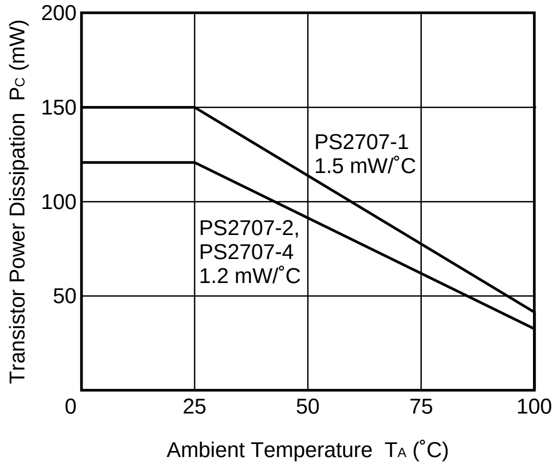


★ TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise specified)

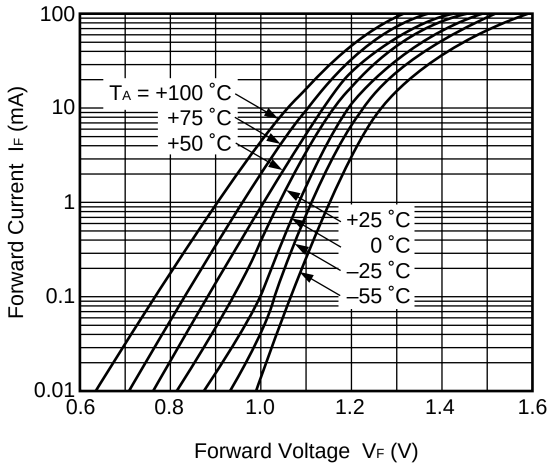
DIODE POWER DISSIPATION vs. AMBIENT TEMPERATURE



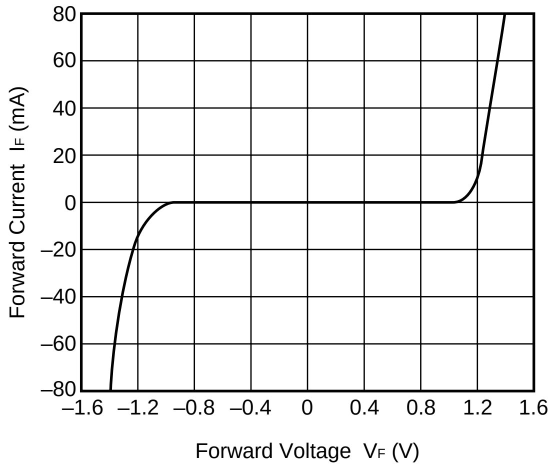
TRANSISTOR POWER DISSIPATION vs. AMBIENT TEMPERATURE



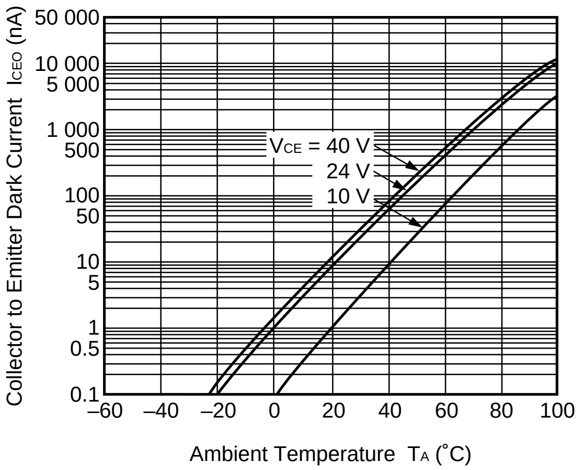
FORWARD CURRENT vs. FORWARD VOLTAGE



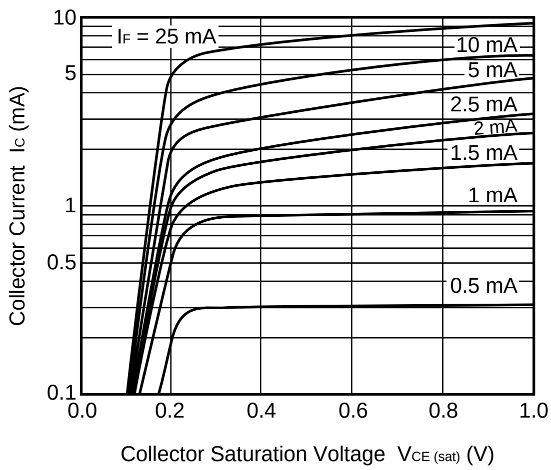
FORWARD CURRENT vs. FORWARD VOLTAGE



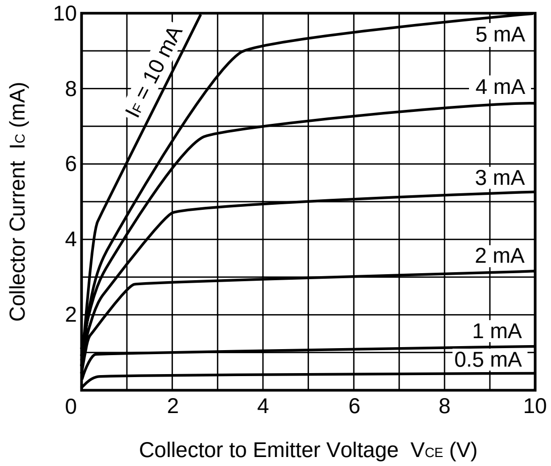
COLLECTOR TO EMITTER DARK CURRENT vs. AMBIENT TEMPERATURE



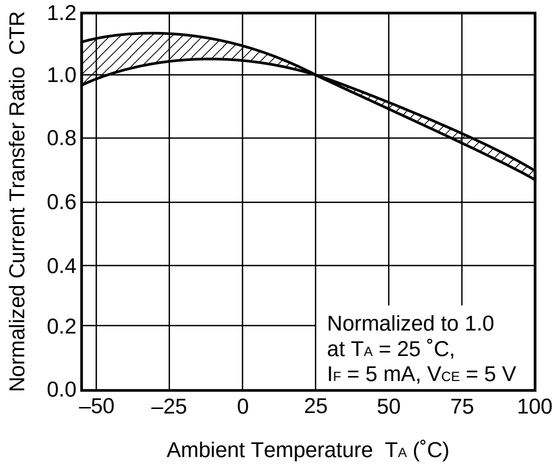
COLLECTOR CURRENT vs. COLLECTOR SATURATION VOLTAGE



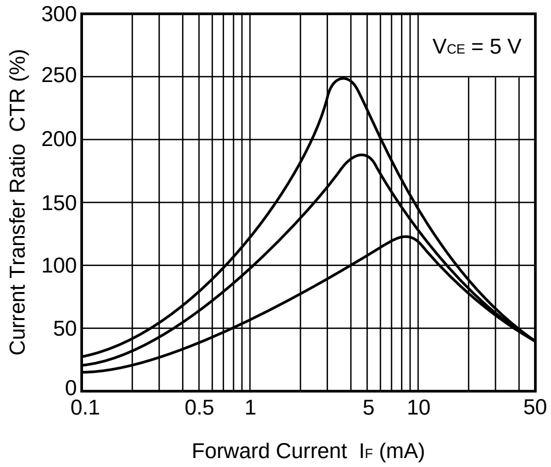
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



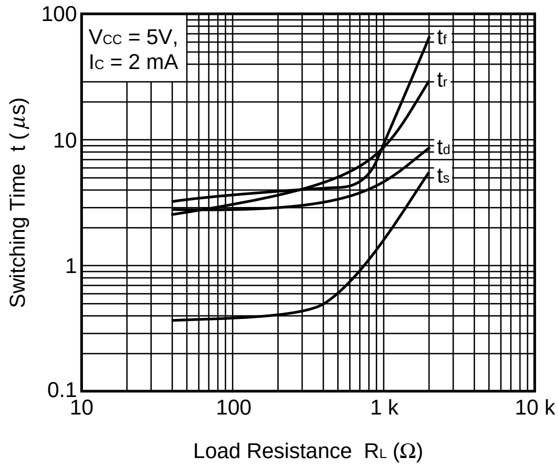
NORMALIZED CURRENT TRANSFER
RATIO vs. AMBIENT TEMPERATURE



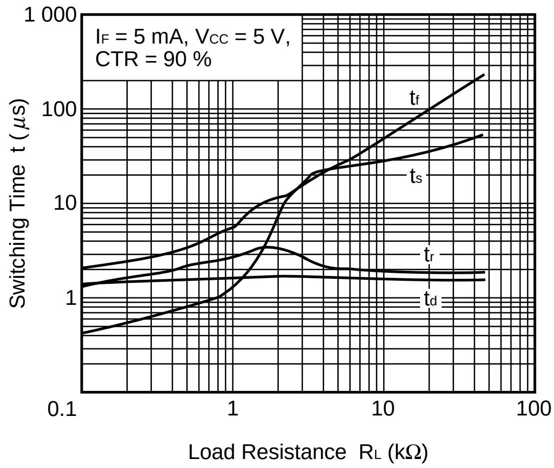
CURRENT TRANSFER RATIO vs.
FORWARD CURRENT



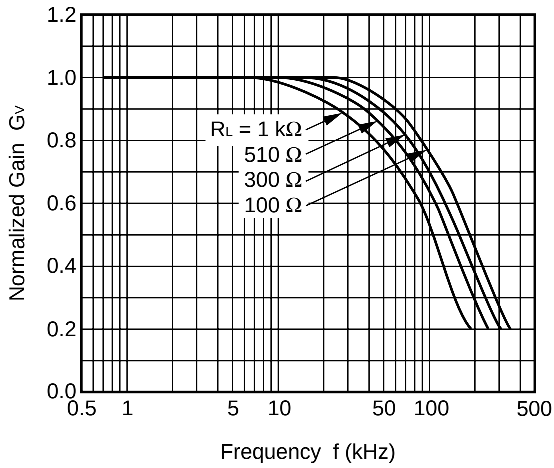
SWITCHING TIME vs.
LOAD RESISTANCE



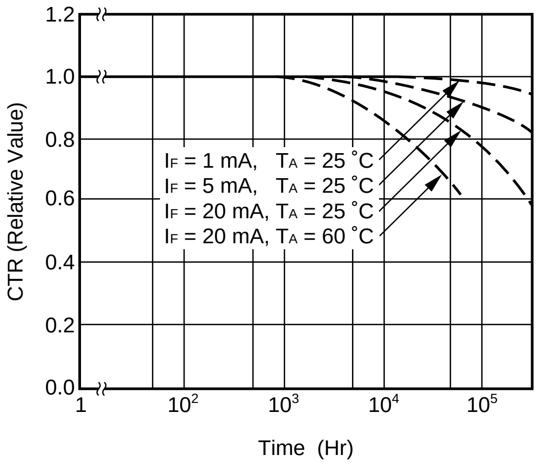
SWITCHING TIME vs.
LOAD RESISTANCE



FREQUENCY RESPONSE



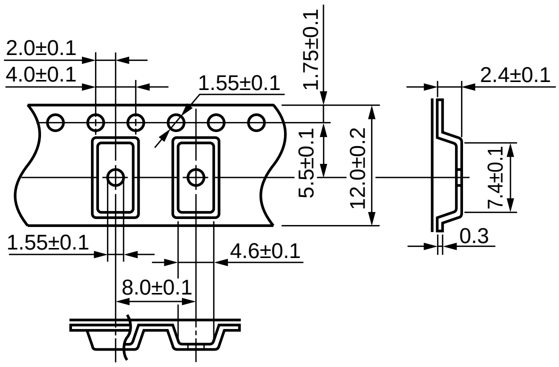
LONG TERM CTR DEGRADATION



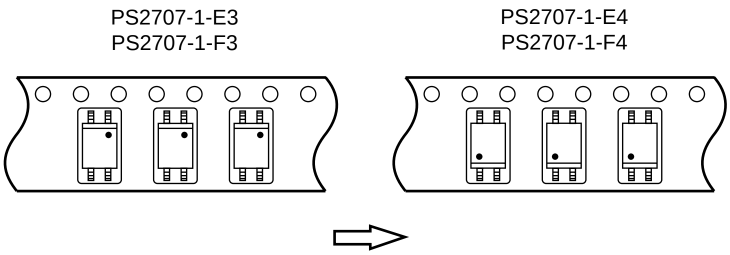
Remark The graphs indicate nominal characteristics.

★ TAPING SPECIFICATIONS (in millimeters)

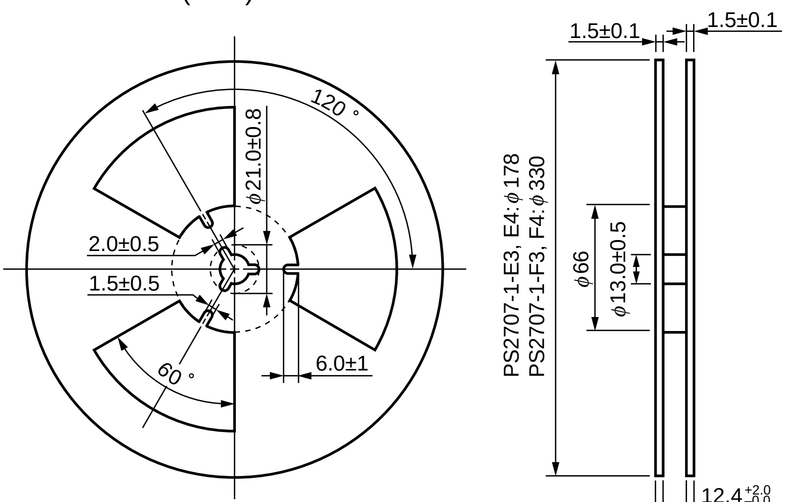
Outline and Dimensions (Tape)



Tape Direction



Outline and Dimensions (Reel)



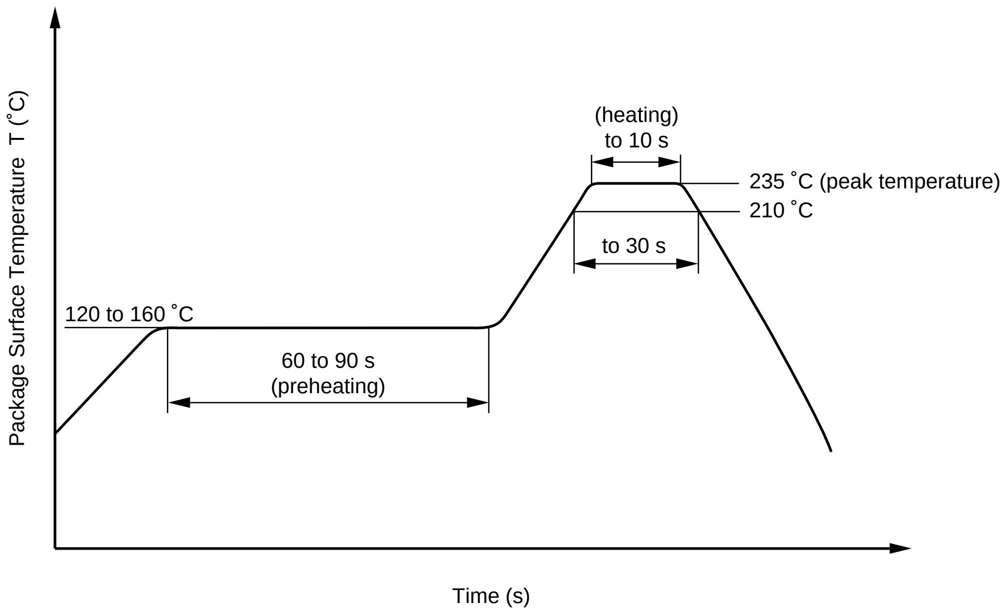
Packing: PS2707-1-E3, E4 900 pcs/reel
PS2707-1-F3, F4 3 500 pcs/reel

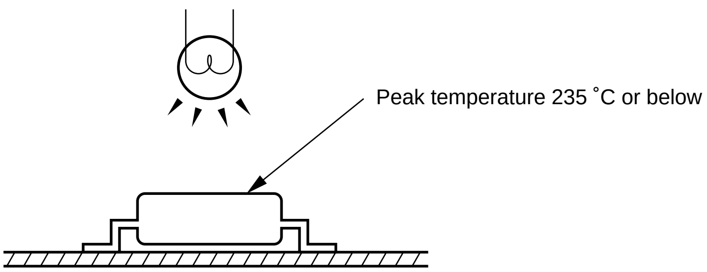
★ RECOMMENDED SOLDERING CONDITIONS

(1) Infrared reflow soldering

- Peak reflow temperature: 235 °C (package surface temperature)
- Time of temperature higher than 210 °C: 30 seconds or less
- Number of reflows: Three
- Flux: Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt % is recommended.)

Recommended Temperature Profile of Infrared Reflow





(2) Dip soldering

- Temperature: 260 °C or below (molten solder temperature)
- Time: 10 seconds or less
- Number of times: One
- Flux: Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt % is recommended.)

(3) Cautions

- Fluxes

  Avoid removing the residual flux with freon-based and chlorine-based cleaning solvent.

SPECIFICATION OF VDE MARKS LICENSE DOCUMENT (VDE0884)

Parameter	Symbol	Speck	Unit
Application classification (DIN VDE 0109) for rated line voltages ≤ 300 Vr.m.s. for rated line voltages ≤ 600 Vr.m.s.		 IV III	
Climatic test class (DIN IEC 68 Teil 1/09.80)		55/100/21	
Dielectric strength maximum operating isolation voltage Test voltage (partial discharge test, procedure a for type test and random test) $U_{pr} = 1.2 \times U_{IORM}$, $P_d < 5$ pC	 U_{IORM} U_{pr}	 710 850	 V_{peak} V_{peak}
Test voltage (partial discharge test, procedure b for random test) $U_{pr} = 1.6 \times U_{IORM}$, $P_d < 5$ pC	U_{pr}	1 140	V_{peak}
Highest permissible overvoltage	U_{TR}	6 000	V_{peak}
Degree of pollution (DIN VDE 0109)		2	
Clearance distance		> 5	mm
Creepage distance		> 5	mm
Comparative tracking index (DIN IEC 112/VDE 0303 part 1)	CTI	175	
Material group (DIN VDE 0109)		III a	
Storage temperature range	T_{stg}	–55 to +150	°C
Operating temperature range	T_A	–55 to +100	°C
Isolation resistance, minimum value V_{IO} = 500 V dc at T_A = 25 °C V_{IO} = 500 V dc at T_A MAX. at least 100 °C	 Ris MIN. Ris MIN.	 10^{12} 10^{11}	 Ω Ω
Safety maximum ratings (maximum permissible in case of fault, see thermal derating curve) Package temperature Current (input current I_F, Psi = 0) Power (output or total power dissipation) Isolation resistance V_{IO} = 500 V dc at T_A = 175 °C (Tsi)	 Tsi Isi Psi Ris MIN.	 150 200 300 10^{9}	 °C mA mW Ω

[MEMO]

CAUTION

Within this device there exists GaAs (Gallium Arsenide) material which is a harmful substance if ingested. Please do not under any circumstances break the hermetic seal.

NEPOC is a trademark of NEC Corporation.